Double Strand Break (DSB) Complexity and Proximity Effects Within the Repair-Misrepair Fixation (RMF) Model for Improved Predictions of Cell Survival From Heavy Ions

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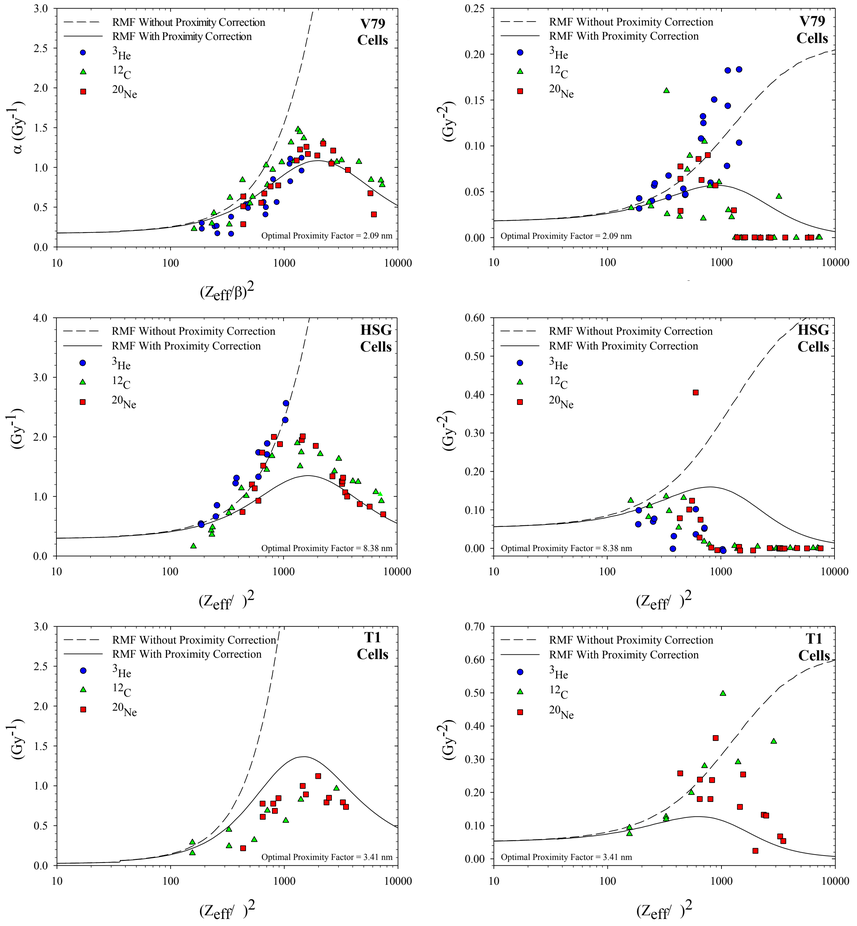
Hypothesis: Two or more DNA double strand breaks (DSB) formed within nanometer-sized regions of chromatin are effectively viewed by DSB repair mechanisms as a single (more complex) DSB. Such a proximity effect creates a trend in the RMF model towards a decrease in relative biological effectiveness (RBE) with increasing linear energy transfer (LET) beyond a particle-specific peak.

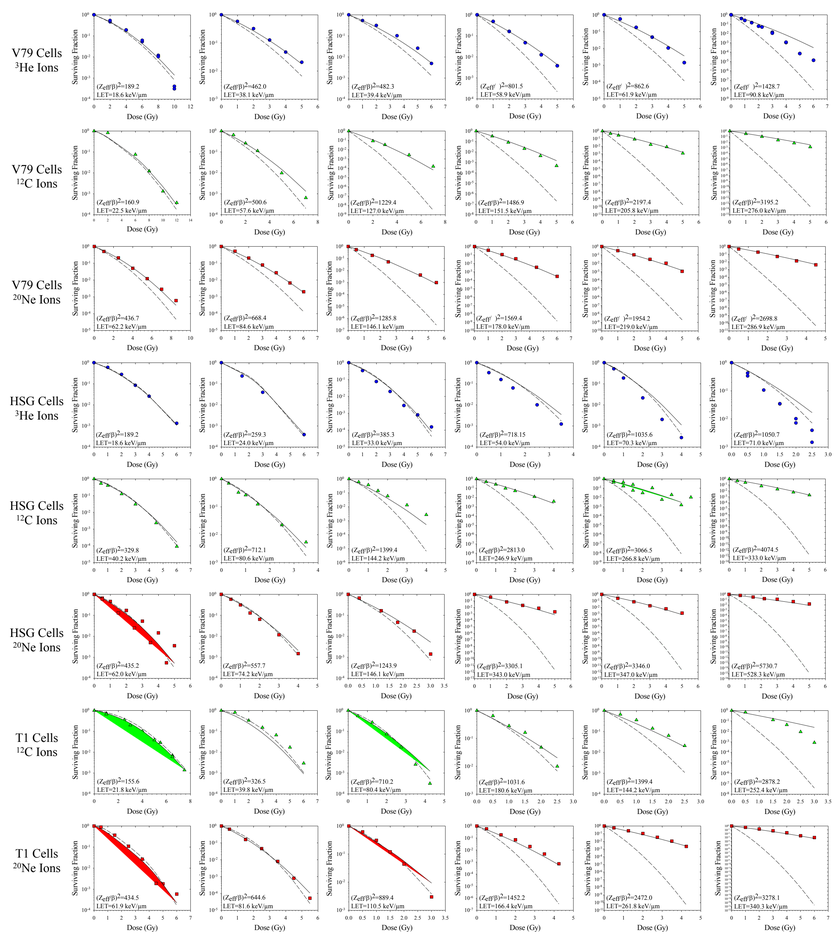
Conclusions: A refined version of the RMF model that accounts for proximity effects (clustering of two or more DSB) on a 2-8.5 nm scale improves the accuracy of RBE and cell survival estimates for normoxic (pO_2=21%) HSG, T1, and V79 cells irradiated by high LET ($Z \geq 2$) ions.

Session: Radiobiology: Experiments and Modeling
July 31st · 1:45PM-3:45PM

Comparison of measured and RMF model estimates of α and β Values



Comparison of measured and RMF survival estimates under normoxic conditions



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